

PATENT ABSTRACTS OF JAPAN

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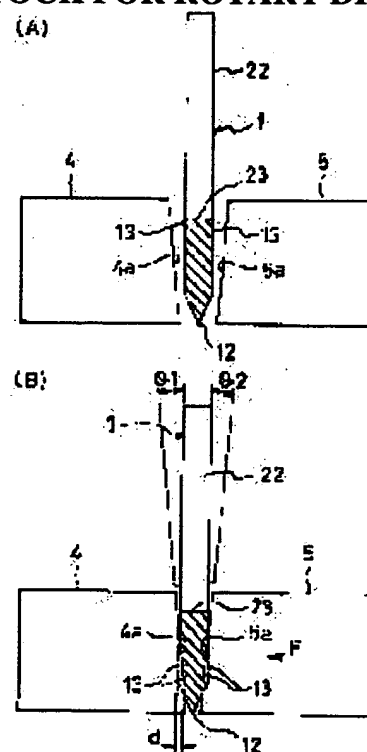
MIZUKAWA SUEHIRO

(54) METHOD AND EQUIPMENT FOR BENDING BLADE STOCK FOR ROTARY DIE

(57)Abstract:

PROBLEM TO BE SOLVED: To bend a band-shaped blade stock across the width without any unprocessed part on the edge-of the blade stock remaining.

SOLUTION: The band-shaped blade stock 1 is subjected to a compressing- stretching process in which the blade stock 1 is compressed in the thickness direction and then stretched longitudinally. In the compressing-stretching process the amount of compression of the blade stock 1 is gradually increased across the width toward one edge. The blade stock 1 is moved in turn in one longitudinal direction of the blade stock 1 while being compressed and stretched. The compressing-stretching process is performed by means of pressing dies 4 and 5.



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CLAIMS

[Claim(s)]

[Claim 1] The edge material bending method for rotary dies characterized by making the above-mentioned amount of compression increase gradually toward the crosswise end edge of edge material in the compression part over edge material at the compression extension process including the compression extension process of compressing the strip-like edge material which has the edge of a blade on the crosswise end edge in the thickness direction, and making a longitudinal direction extending the edge material.

[Claim 2] The edge material bending method for rotary dies indicated to the claim 1 which performs the above-mentioned compression extension process to the edge material after bending the strip-like edge material which has the edge of a blade on the crosswise end edge in a request configuration.

[Claim 3] The edge material bending method for rotary dies indicated to either the claim 1 which, on the other hand, makes the part which performs the above-mentioned compression extension process shift to ** one by one in the longitudinal direction of edge material, or the claim 2.

[Claim 4] The edge material bending method for rotary dies indicated to either the claim 1 which performs the above-mentioned compression extension process using the press die equipped with the long and slender press side crosswise [of edge material], or the claim 3.

[Claim 5] The edge material bending method for rotary dies indicated to the claim 4 which performs the above-mentioned compression extension process by arranging the above-mentioned press die in the approach estrangement direction possible [relative displacement] at the both sides which sandwich edge material, and carrying out approach movement of these press dies relatively.

[Claim 6] The edge material bending method for rotary dies indicated to either the claim 4 which performs the above-mentioned compression extension process using the above-mentioned press die with which the above-mentioned press side inclines to the superficies of the edge material which counters the press side, or the claim 5.

[Claim 7] The edge material bending method for rotary dies of having indicated the edge material to which the infeed of the shape of a long slit possesses crosswise in two or more places which separated the interval of a longitudinal direction, and the interval size of the infeed edge in an infeed formation part and the crosswise edge of edge material is shorter than the width-of-face size in the part in which the infeed is not formed to either the claim 1 made into a bending object, or the claim 6.

[Claim 8] While having the press die of the couple arranged in the approach estrangement direction possible [relative displacement] by the both sides which insert into a crosswise end edge the strip-like edge material which has the edge of a blade By a press side long and slender to the cross direction of edge material possessing in these press dies, and carrying out relative approach movement of these press dies Edge material bending equipment for rotary dies characterized by compressing in the thickness direction and making a longitudinal direction extend the edge material so that the amount of compression of edge material may increase gradually or dwindle the part which those press sides have two incomes and edge material compresses toward the crosswise end edge of edge material.

[Claim 9] each press side of the press die of a couple -- them -- each -- **** -- the edge material bending equipment for rotary dies indicated to the claim 8 which presses the part which edge material compresses and is compressed in the state where it inclined to the superficies of the edge material which counters

[Claim 10] Edge material bending equipment for rotary dies which the press die of one side was fixed to the regular position among the press dies of a couple, and the press die of the other side indicated to the press die of one side to the claim 8 or claim 9 in which approach estrangement movement is possible.

[Claim 11] Edge material bending equipment for rotary dies indicated to the claim 9 or claim 10 by which the press die of one side is connected with the tilting mechanism for carrying out change regulation of the degree of tilt angle of the press side of the press die.

[Claim 12] Edge material bending equipment for rotary dies with which the other end of this arm indicated this arm to the claim 11 connected with the eccentric cam mechanism for making it rock by the circumference of a pivot while the press die of the other side was connected with the end section of the arm which can be rocked to the circumference of a pivot.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the method for carrying out bending of the edge material for rotary dies, and the equipment for it.

[0002]

[Description of the Prior Art] The case where cut to the works W, such as the paper board, using the rotary die 100 which attached the edge material 1 in drawing 14 and drawing 15, and an eye and a perforation are formed is shown theoretically. The rotary die 100 is used combining Annville 200 used as a receptacle side roller. The edge material 1 attached in the rotary die 100 is curving in the form where the edge of a blade 12 becomes the peripheral face of the rotary die 100, and parallel while the edge of a blade 12 with which the crosswise end edge is equipped has projected from the peripheral face of the rotary die 100. And if a work 1 is sent in like an arrow between them, rotating the rotary die 100 and Annville 200, the formal end eye or formal perforation corresponding to the configuration of the edge of a blade 12 of the edge material 1 will be formed in Work W. In addition, it is made from a thing, rubber, etc. with a hard front face by Annville 200 by iron, and what has a soft front face is used properly suitably in it.

[0003] The case where what purchased the edge material 1 of the shape of a straight strip as shown in drawing 16 in the edge material 1 attached in the rotary die 100, and carried out bending to it circularly like drawing 17 is used, and the ready-made article, with which bending of the overall-length portion was beforehand carried out circularly like drawing 19 may be purchased and used, and in the latter, although the edge of a blade 12 was set to various curvatures, it can purchase. Moreover, in the former, there is an advantage that the curvature of the edge of a blade 12 can be set to a desired value by bending. And when using what purchased the straight strip-like edge material 1 like the former, and carried out bending circularly, the method of sending on both sides of [crosswise] the strip-like edge material 1 on the occasion of bending with three rollers 301,302,303 like drawing 17 is adopted. In addition, by this method, the roller 302,303 of the side supporting the edge of a blade 12 is equipped with the slot 304 for supporting the edge of a blade 12 by non-contact. This method is indicated by JP,46-18352,B.

[0004]

[Problem(s) to be Solved by the Invention] However, there is a problem that the case where the thing of curvature suitable in it is not found though various things are prepared for the curvature of the edge of a blade 12 when purchasing and using the ready-made article with which bending of an overall-length portion like drawing 19 was carried out circularly beforehand arises plentifully. moreover, in using what purchased the straight strip-like edge material 1 like the former, and carried out bending circularly The straight raw portion A remains in the both ends of the edge material 1 after bending shown in this drawing unescapable on the structure of the bending equipment explained by drawing 17. Since it is obliged to perform processing in which it leaves only the significant part by which excised the raw portion A and bending was carried out, there is a problem of the material yield falling and becoming cost quantity.

[0005] this invention being made in view of the above problem, and carrying out bending of the overall-length

portion of straight strip-like edge material -- being possible -- in addition -- and it also aims also deforming the edge of a blade into the curve configuration which swelled and came out, and deforming the edge of a blade into the curve configuration which carried out the reentrant at offering the bending method of the edge material for rotary dies which becomes possible, and this bending equipment

[0006] Moreover, this invention aims at offering the bending method of the edge material for rotary dies which can carry out bending of the edge material, and this bending equipment, without needing skill.

[0007] Furthermore, this invention aims at offering the bending method of the edge material for rotary dies which can carry out bending of the edge material with high precision by computer control, and this bending equipment.

[0008]

[Means for Solving the Problem] The bending method of the edge material for rotary dies concerning this invention is a thing of making the above-mentioned amount of compression increase gradually toward the crosswise end edge of edge material at the compression extension process in the compression part over edge material including the compression extension process of compressing the strip-like edge material which has the edge of a blade on the crosswise end edge in the thickness direction, and making a longitudinal direction extending the edge material. Here, the amount of compression means the thick decrement (reduction width of face) produced in edge material, when edge material is compressed in the thickness direction.

[0009] In this invention method, if the compression extension process of making the amount of compression increase gradually toward the crosswise end edge of edge material in the compression part over edge material is performed, a part with the extension length of the edge material by compression near the edge of a blade will become long, and the part more distant from the edge of a blade will become short. Therefore, it deforms into the curve configuration out of which the edge of a blade of edge material swelled and came in a compression part. Moreover, since it says that this method performs the compression extension process of compressing edge material in the thickness direction and making a longitudinal direction extending the edge material It is possible to perform the same compression extension process also to pars intermedia also to the edge of edge material, consequently it is not necessary to excise the edge of edge material and to perform processing in which it leaves only significant part, and it becomes possible to raise the material yield so much.

[0010] After bending the strip-like edge material which has the edge of a blade on the crosswise end edge in a request configuration by this invention method, it is possible to adopt the procedure of performing the above-mentioned compression extension process to the edge material. According to this, after bending straight strip-like edge material using an automatic bender, it becomes possible to make the edge of a blade deform into a curve configuration.

[0011] According to [it is possible to adopt the means of on the other hand making the part which performs the above-mentioned compression extension process shift to ** one by one by the longitudinal direction of edge material by this invention method, and] this Since the part which edge material compresses can be sent into the place which performs a compression extension process only by passing edge material to a longitudinal direction around when a means to perform a compression extension process in the regular position to edge material is adopted Edge material is passed around, or it becomes unnecessary to repeat carrying out backward feed, and bending efficiency improves so much.

[0012] In this invention method, if the above-mentioned compression extension process can be performed using the press die equipped with the long and slender press side crosswise [of edge material] and it is made such, it will become possible to centralize the press force by the long and slender press side of a press die on edge material, and to make edge material extend efficiently.

[0013] By this invention method, the above-mentioned press die can be arranged in the approach estrangement direction possible [relative displacement] at the both sides which sandwich edge material, and the above-mentioned compression extension process can be performed by carrying out approach movement of these press dies relatively. In this case, even if it is made to carry out approach movement of both press dies of the both sides of edge material mutually, the press die of one side is fixed to the regular position, and it may be made to carry out approach estrangement movement only of the press die of the other side to the press die of

one side.

[0014] It is desirable to perform the above-mentioned compression extension process using the above-mentioned press die with which the above-mentioned press side inclines by this invention method to the external surface of the edge material which counters the press side. the time of performing a compression extension process according to this -- a press die -- straight or abbreviation -- the amount of compression of edge material comes to increase gradually or gradually decrease toward the crosswise end edge of edge material only by making it move straightly and pushing against edge material

[0015] It is desirable to set the edge material to which the infeed of the shape of a long slit possesses crosswise in two or more places which separated the interval of a longitudinal direction, and the interval size of the infeed edge in an infeed formation part and the crosswise edge of edge material is shorter than the width-of-face size in the part in which the infeed is not formed by this invention method as the bending object. According to this, even if it is edge material with a long width-of-face size, the interval size of the infeed edge in an infeed formation part and the crosswise edge of edge material is shortened, and there is an advantage which the infeed formation part can be made easy to turn at.

[0016] The edge material bending equipment for rotary dies concerning this invention While having the press die of the couple arranged in the approach estrangement direction possible [relative displacement] by the both sides which insert into a crosswise end edge the strip-like edge material which has an addendum By a press side long and slender to the cross direction of edge material possessing in these press dies, and carrying out relative approach movement of these press dies It compresses in the thickness direction and a longitudinal direction is made to extend the edge material so that the amount of compression of edge material may increase gradually or dwindle the part which those press sides have two incomes and edge material compresses toward the crosswise end edge of edge material.

[0017] this invention equipment -- each press side of the press die of a couple -- them -- each -- **** -- it is desirable to press the part which edge material compresses and to compress in the state where it inclined to the external surface of the edge material which counters

[0018] Moreover, the press die of the other side is able to fix the press die of one side to the regular position among the press dies of a couple, and to adopt the composition that approach estrangement movement is possible, to the press die of one side with this invention equipment. In this case, the composition that the press die of one side is connected with the tilting mechanism for carrying out change regulation of the degree of tilt angle of the press side of the press die is employable. According to this, it becomes easy by changing the degree of tilt angle of the press side of the press die of one side to change the rate of change of the amount of compression in the cross direction of edge material, and to make desirable conditions to bending.

[0019] While the press die of the other side is connected with the end section of the arm which can be rocked to the circumference of a pivot with this invention equipment, it is possible to adopt the composition that the other end of this arm is connected with the eccentric cam mechanism for making this arm rock by the circumference of a pivot. According to this, an eccentric cam mechanism enables it to give the big press force to the press die of the other side, though it is small.

[0020]

[Embodiments of the Invention] The external view having shown the operation form of the edge material bending equipment for rotary dies which drawing 1 requires for this invention, and drawing 2 are explanatory drawings having shown the internal structure etc.

[0021] The press dies 4 and 5 of a couple are arranged with the posture in which this edge material bending equipment is installed on the case 2, and the bench 3 carries out phase opposite on at the bench 3 top. The tilting mechanism 6 for carrying out change regulation of the degree of tilt angle of press side 4a of the press die 4 of one side, and the arm 7 and the eccentric cam mechanism 8 for carrying out approach estrangement movement of the press die 5 of the other side to the press die 4 of one side are built in the case 2.

[0022] two upper and lower sides of the base material 9 of the standing-up posture to which the above-mentioned tilting mechanism 6 equipped the upper-limit section with the press die 4 of one side -- a screw thread -- the connection which has holes 11 and 11, while members 10 and 10 are attached in the

circumference of a horizontal axis free [rotation] It is thrust. where the outer wall 12 of a case 2 is ****(ed), it was attached in two upper and lower sides of the outer wall 12 free [rotation] -- ****ing -- shafts 13 and 13 -- the above-mentioned connection -- the screw thread of members 10 and 10 -- holes 11 and 11 -- each -- **** -- The screw-thread shafts 13 and 13 are equipped with the tongues 14 and 14 which can carry out rotation operation from the outside of a case 2. In this tilting mechanism 6, the up-and-down tongues 14 and 14 therefore, by carrying out rotation operation individually connection -- the screw thread of members 10 and 10, if increase and decrease of the amount of bell and spigots of the screw-thread shafts 13 and 13 over holes 11 and 11 of regulation are carried out Since a base material 9 tilts, the standing-up angle changes and the degree of tilt angle to the vertical plane of press side 4a of the press die 4 changes in connection with it, it is possible to perform such regulation and to carry out change regulation of the degree of tilt angle of press side 4a.

[0023] On the other hand, the above-mentioned arm 7 which equipped the upper-limit section with the press die 5 of the other side is supported by the level pivot 15 of position fixation of the part near the bottom of the press die 5 at the rockable. moreover -- while the eccentric cam mechanism 8 has the rotating cam 18 which fixed to the axis of rotation 17 of a motor 16 -- this rotating cam 18 -- the soffit section of the above-mentioned arm 7 -- a possession **** long hole-like cam -- it has the composition which fitted into the hole 19 for this reason -- if a motor 16 is driven and a rotating cam 18 is rotated -- a rotating cam 18 -- a cam -- it slides with a hole 19, an arm 7 carries out both-way rocking around a pivot 15, and the press die 5 carries out approach estrangement movement to the press die 4 of one side through rocking of such an arm 7 In addition, the above-mentioned press dies 4 and 5 of a couple are projected on the bench 3 through the opening 21 of the shape of a slit established in the bench 3. Moreover, in drawing 1 , 20 shows the switch for controlling a motor 16 (drawing 2).

[0024] Explanatory drawing in which drawing 3 showed the physical relationship of the strip-like edge material 1 and press side 4a of the press die 4 of one side, drawing 4 (A), and (B) are explanatory drawings which expressed with the cross section the portion which meets the IV-IV line of drawing 3 . Like drawing 3 , the edge material 1 as a bending object is a strip-like, and has the edge of a blade 12 on the crosswise end edge. And two or more places which separated the interval of a longitudinal direction are equipped crosswise with the infeed 22 of the shape of a long slit, and the interval size H2 of the infeed edge 23 in those infeed formation parts and the crosswise end edge (edge of a blade 12) of the edge material 1 is shorter than the width-of-face size H1 in the part in which the infeed is not formed.

[0025] Moreover, as explanatorily shown in drawing 4 (A) and (B), each press side 4a and 5a has countered, and, as for the press dies 4 and 5 of a couple, the edge material 1 is arranged among them. Moreover, as 4a of the press die 4 of one side was explanatorily shown in drawing 3 , each press sides 4a and 5a have the long and slender configuration crosswise [of the edge material 1]. Any even if these press sides 4a and 5a are flat flat sides, they choose by the horizontal section configuration being the cylinder side out of which swelled circularly and it came should take into consideration the degree of hardness of the edge material 1 etc., and it should choose suitably.

[0026] Furthermore, each press sides 4a and 5a of the press dies 4 and 5 of a couple incline the edge material 1 arranged perpendicularly among them in the shape of an upper aperture to the perpendicular external surface 13 and 13 of the edge material 1 by ***** so that it may understand by drawing 4 (B). By the example of drawing, although the degree theta 1 of tilt angle of press side 4a of the press die 4 of the one side which receives the external surface 13 of the edge material 1, and the degree theta 2 of tilt angle of press side 5a of the press die 5 of the other side are set as the same angle, changing these degrees theta1 and theta2 of tilt angle is also considered.

[0027] Next, how to carry out bending of the edge material 1 using the above-mentioned edge material bending equipment is explained. After turning the edge material 1 among them, turning the edge of a blade 12 down and arranging perpendicularly in the state where the press die 5 of the other side was made to desert to the press die 4 of one side by this method like drawing 2 or drawing 4 (A), the press die 4 of one side is made to carry out approach movement of the press die 5 of the other side in an operation of the eccentric cam

mechanism 8 by starting the motor 16 explained by drawing 2 . Since press side 5a of the press die 5 of the other side forces the edge material 1 on press side 4a of the press die 4 of one side like the arrow F of drawing 4 (B) by doing in this way, the edge material 1 is inserted by the press dies 4 and 5 of these couples, it is compressed in the thickness direction, the amount of compression at that time is balanced, and the edge material 1 extends to a longitudinal direction. It is a compression extension process. Sign d has shown the maximum amount of compression of the edge material 1 compressed by press of press side 4a of the press die 4 of one side, i.e., the thick maximum decrement of the edge material 1 produced by compression, (the maximum reduction width of face) to drawing 4 (B).

[0028] Here, since each press side 4a and 5a inclines in the upper aperture state to the external surface 13 and 13 of the edge material 1, at this compression extension process, the amount of compression increases gradually the part near the edge of a blade 12 in the compression part over the edge material 1. Therefore, a part with the extension length of the edge material 12 by compression near the edge of a blade balances the amount of compression, and becomes long, and the part more distant from the edge of a blade 12 balances the amount of compression, and becomes short. Moreover, the edge of a blade 12 extends only length face **** simultaneously same length, although the compression part near the edge of a blade 12 extends. Therefore, it deforms into the curve configuration out of which the edge of a blade 12 of the edge material 1 swelled and came in a compression part.

[0029] With this operation form, since it has compressed by ****(ing) the edge material 1 in respect of [4a and 5a] long and slender press of the press dies 4 and 5, the press force by the long and slender press sides 4a and 5a concentrates on the compression part of edge material efficiently, and extension of the edge material 1 is performed efficiently.

[0030] In bending of the edge material 1, the work of bending the edge of a blade 12 in the range or overall-length portion as which the edge material 1 was determined is done. In this case, it is a means to, move to ** the edge material 1 placed on the bench 3 explained by drawing 1 or drawing 2 one by one on the other hand by the longitudinal direction, and it is desirable to locate the range or overall-length portion as which the edge material 1 was determined among the press dies 4 and 5 of a couple one after another, and to repeat the compression extension process by those press dies 4 and 5. For example, parts N1 and N2 which the edge material 1 compresses by moving the edge material 1 in the direction of arrow a as explanatorily shown in drawing 5 Nn is located among the press dies 4 and 5 of a couple one after another, and they are those parts N1 and N2.. A compression extension process is repeated to Nn. If it does in this way, the edge of a blade 12 will deform in the shape of a curve in the range or overall-length portion as which the edge material 1 was determined. In the edge material 1 shown in drawing 5 , the compression extension process is carried out to the illustrated whole range. It may be possible for a crevice to be appointed between the parts to compress and for it to be made not to perform a compression extension process to the crevice portion depending on the case, although it is desirable to carry out with a means to define without a crevice the part which the edge material 1 compresses, and to carry out compression extension of those parts one after another as for a compression extension process as shown in drawing 5 .

[0031] Drawing 9 has illustrated the plane view configuration of the edge material 1 of the shape of a strip with possible making the edge of a blade 12 deform with the application of the bending method and bending equipment which were explained with the above-mentioned operation gestalt. . In the edge material of this drawing, it has the portion P1 which swelled and appeared in the interstitial segment of the longitudinal direction of the edge material 1 at one side, and has the portions P2 and P3 which swelled and appeared in the both sides at the side else. Such edge material 1 of a configuration can be manufactured using an automatic edge material bender. Moreover, drawing 11 - drawing 13 show the bending procedure for obtaining the edge material 1 attached in the rotary die 100 explained by drawing 14 . Drawing 11 shows the edge material 1 by which bending was carried out to the plane view abbreviation rectangle using the automatic edge material bender, and it is possible to apply the bending method which starts this invention to this edge material 1. In the edge material 1 before applying the bending method concerning this invention, the whole edge of a blade 12 is located on the virtual level surface so that it may understand by drawing 11 . Drawing 12 shows the state

where bending of the one side of the rectangular edge material 1 was carried out in the way explained by drawing 5 from the edge to the middle part. As shown in this drawing, in this stage, it is changing to the curve configuration out of which the side view configuration of the edge of a blade 1 swelled and came in the portion into which bending was performed. The edge material 1 obtained by performing such bending to one side and its opposite side of the rectangular edge material 1 is shown in drawing 13.

[0032] It is also possible to start from the interstitial segment of the range as which the compression extension process was determined at this point to the edge material 1 although the case where a compression extension process was performed sequentially from the edge was explained and it excelled with the operation gestalt explained above to the range or overall-length portion as which the edge material 1 was determined, or an overall-length portion. Drawing 8 shows the configuration of the press sides 4a and 5a in the case of performing a former means, and this configuration is the same as the configuration of the press sides 4a and 5a where it explained with the operation gestalt.

[0033] Moreover, it is also possible by devising a device to the configuration of the above-mentioned press dies 4 and 5 of a couple to carry out bending in the part which is curving in the thickness direction of the edge material 1, or to carry out bending in the part crooked right-angled in the thickness direction of the edge material 1. Drawing 6 shows the former example. The plane view configuration of the press dies 4 and 5 of a couple is made into point ***** , and the press sides 4a and 5a are made to provide at those noses of cam in this example. Since it is possible to arrange the press die 4 to the space even if the space by the side of the internal corner of the curve part of the edge material 1 is narrow if such press dies 4 and 5 are used, it is possible to carry out bending in the part which is curving in the thickness direction of the edge material 1. Moreover, drawing 7 shows the latter example. One [at least] side of the press dies 4 and 5 of a couple is made into the flat sides 4b and 5b, and flat side 4b of the press die 4 of one side is made to have met the superficies of the internal-corner part of the edge material 1 in this example. In this way, if it sets, it is possible to carry out bending of the edge material 1 crooked right-angled with the press dies 4 and 5 of a couple in the incurvation part. Proper use of such press dies 4 and 5 is attained by making the press dies 4 and 5 removable composition to the base material 6 and arm 7 which were explained by drawing 2.

[0034] Drawing 10 shows the modification of the edge material 1 which is a bending object. The edge of a blade 12 is formed in the wave in this edge material 1. If bending of such edge material 1 is carried out, the edge material for rotary dies which can be used for forming a perforation in a work will be obtained.

[0035] In drawing 2, although what carries out approach estrangement is explained to the press die 4 of one side and it excels in it when the press die 5 of the other side rocks a pivot 15 as a center, the press die 5 of the other side moves horizontally, and approach estrangement can be carried out at the press die 4 of one side.

[0036]

[Effect of the Invention] also carrying out bending of the straight strip-like edge material partially according to this invention, and as mentioned above, also carrying out bending of the overall-length portion -- possible -- in addition -- and it becomes possible to offer the bending method of the edge material for rotary dies of becoming possible to also deform the edge of a blade into the curve configuration which swelled and came out, and to also deform the edge of a blade into the curve configuration which carried out the reentrant, and this bending equipment

[0037] Moreover, this invention invention and equipment can be controlled using a computer, and it becomes possible to carry out bending of the edge material, without needing skill by doing so.

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TECHNICAL FIELD

[The technical field to which invention belongs] this invention relates to the method for carrying out bending of the edge material for rotary dies, and the equipment for it.

[Translation done.]

JAPANESE [JP,2003-001352,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

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EFFECT OF THE INVENTION

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[0037] Moreover, this invention invention and equipment can be controlled using a computer, and it becomes possible to carry out bending of the edge material, without needing skill by doing so.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, there is a problem that the case where the thing of curvature suitable in it is not found though various things are prepared for the curvature of the edge of a blade 12 when purchasing and using the ready-made article with which bending of an overall-length portion like drawing 19 was carried out circularly beforehand arises plentifully. moreover, in using what purchased the straight strip-like edge material 1 like the former, and carried out bending circularly The straight raw portion A remains in the both ends of the edge material 1 after bending shown in this drawing unescapable on the structure of the bending equipment explained by drawing 17. Since it is obliged to perform processing in which it leaves only the significant part by which excised the raw portion A and bending was carried out, there is a problem of the material yield falling and becoming cost quantity.

[0005] this invention being made in view of the above problem, and carrying out bending of the overall-length portion of straight strip-like edge material -- being possible -- in addition -- and it also aims also deforming the edge of a blade into the curve configuration which swelled and came out, and deforming the edge of a blade into the curve configuration which carried out the reentrant at offering the bending method of the edge material for rotary dies which becomes possible, and this bending equipment

[0006] Moreover, this invention aims at offering the bending method of the edge material for rotary dies which can carry out bending of the edge material, and this bending equipment, without needing skill.

[0007] Furthermore, this invention aims at offering the bending method of the edge material for rotary dies which can carry out bending of the edge material with high precision by computer control, and this bending equipment.

[Translation done.]

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MEANS

[Means for Solving the Problem] The bending method of the edge material for rotary dies concerning this invention is a thing of making the above-mentioned amount of compression increase gradually toward the crosswise end edge of edge material at the compression extension process in the compression part over edge material including the compression extension process of compressing the strip-like edge material which has the edge of a blade on the crosswise end edge in the thickness direction, and making a longitudinal direction extending the edge material. Here, the amount of compression means the thick decrement (reduction width of face) produced in edge material, when edge material is compressed in the thickness direction.

[0009] In this invention method, if the compression extension process of making the amount of compression increase gradually toward the crosswise end edge of edge material in the compression part over edge material is performed, a part with the extension length of the edge material by compression near the edge of a blade will become long, and the part more distant from the edge of a blade will become short. Therefore, it deforms into the curve configuration out of which the edge of a blade of edge material swelled and came in a compression part. Moreover, since it says that this method performs the compression extension process of compressing edge material in the thickness direction and making a longitudinal direction extending the edge material It is possible to perform the same compression extension process also to pars intermedia also to the edge of edge material, consequently it is not necessary to excise the edge of edge material and to perform processing in which it leaves only significant part, and it becomes possible to raise the material yield so much.

[0010] After bending the strip-like edge material which has the edge of a blade on the crosswise end edge in a request configuration by this invention method, it is possible to adopt the procedure of performing the above-mentioned compression extension process to the edge material. According to this, after bending straight strip-like edge material using an automatic bender, it becomes possible to make the edge of a blade deform into a curve configuration.

[0011] According to [it is possible to adopt the means of on the other hand making the part which performs the above-mentioned compression extension process shift to ** one by one by the longitudinal direction of edge material by this invention method, and] this Since the part which edge material compresses can be sent into the place which performs a compression extension process only by passing edge material to a longitudinal direction around when a means to perform a compression extension process in the regular position to edge material is adopted Edge material is passed around, or it becomes unnecessary to repeat carrying out backward feed, and bending efficiency improves so much.

[0012] In this invention method, if the above-mentioned compression extension process can be performed using the press die equipped with the long and slender press side crosswise [of edge material] and it is made such, it will become possible to centralize the press force by the long and slender press side of a press die on edge material, and to make edge material extend efficiently.

[0013] By this invention method, the above-mentioned press die can be arranged in the approach estrangement direction possible [relative displacement] at the both sides which sandwich edge material, and the above-mentioned compression extension process can be performed by carrying out approach movement of these press dies relatively. In this case, even if it is made to carry out approach movement of both press dies of the

both sides of edge material mutually, the press die of one side is fixed to the regular position, and it may be made to carry out approach estrangement movement only of the press die of the other side to the press die of one side.

[0014] It is desirable to perform the above-mentioned compression extension process using the above-mentioned press die with which the above-mentioned press side inclines by this invention method to the superficies of the edge material which counters the press side. the time of performing a compression extension process according to this -- a press die -- straight or abbreviation -- the amount of compression of edge material comes to increase gradually or gradually decrease toward the crosswise end edge of edge material only by making it move straightly and pushing against edge material

[0015] It is desirable to set the edge material to which the infeed of the shape of a long slit possesses crosswise in two or more places which separated the interval of a longitudinal direction, and the interval size of the infeed edge in an infeed formation part and the crosswise edge of edge material is shorter than the width-of-face size in the part in which the infeed is not formed by this invention method as the bending object. According to this, even if it is edge material with a long width-of-face size, the interval size of the infeed edge in an infeed formation part and the crosswise edge of edge material is shortened, and there is an advantage which the infeed formation part can be made easy to turn at.

[0016] The edge material bending equipment for rotary dies concerning this invention While having the press die of the couple arranged in the approach estrangement direction possible [relative displacement] by the both sides which insert into a crosswise end edge the strip-like edge material which has an addendum By a press side long and slender to the cross direction of edge material possessing in these press dies, and carrying out relative approach movement of these press dies It compresses in the thickness direction and a longitudinal direction is made to extend the edge material so that the amount of compression of edge material may increase gradually or dwindle the part which those press sides have two incomes and edge material compresses toward the crosswise end edge of edge material.

[0017] this invention equipment -- each press side of the press die of a couple -- them -- each -- **** -- it is desirable to press the part which edge material compresses and to compress in the state where it inclined to the superficies of the edge material which counters

[0018] Moreover, the press die of the other side is able to fix the press die of one side to the regular position among the press dies of a couple, and to adopt the composition that approach estrangement movement is possible, to the press die of one side with this invention equipment. In this case, the composition that the press die of one side is connected with the tilting mechanism for carrying out change regulation of the degree of tilt angle of the press side of the press die is employable. According to this, it becomes easy by changing the degree of tilt angle of the press side of the press die of one side to change the rate of change of the amount of compression in the cross direction of edge material, and to make desirable conditions to bending.

[0019] While the press die of the other side is connected with the end section of the arm which can be rocked to the circumference of a pivot with this invention equipment, it is possible to adopt the composition that the other end of this arm is connected with the eccentric cam mechanism for making this arm rock by the circumference of a pivot. According to this, an eccentric cam mechanism enables it to give the big press force to the press die of the other side, though it is small.

[0020]

[Embodiments of the Invention] The external view having shown the operation gestalt of the edge material bending equipment for rotary dies which drawing 1 requires for this invention, and drawing 2 are explanatory drawings having shown the internal structure etc.

[0021] The press dies 4 and 5 of a couple are arranged with the posture in which this edge material bending equipment is installed on the case 2, and the bench 3 carries out phase opposite on at the bench 3 top. The tilting mechanism 6 for carrying out change regulation of the degree of tilt angle of press side 4a of the press die 4 of one side, and the arm 7 and the eccentric cam mechanism 8 for carrying out approach estrangement movement of the press die 5 of the other side to the press die 4 of one side are built in the case 2.

[0022] two upper and lower sides of the base material 9 of the standing-up posture to which the above-

mentioned tilting mechanism 6 equipped the upper-limit section with the press die 4 of one side -- a screw thread -- the connection which has holes 11 and 11, while members 10 and 10 are attached in the circumference of a horizontal axis free [rotation] It is thrust. where the outer wall 12 of a case 2 is ****(ed), it was attached in two upper and lower sides of the outer wall 12 free [rotation] -- ****ing -- shafts 13 and 13 -- the above-mentioned connection -- the screw thread of members 10 and 10 -- holes 11 and 11 -- each -- **** -- The screw-thread shafts 13 and 13 are equipped with the tongues 14 and 14 which can carry out rotation operation from the outside of a case 2. In this tilting mechanism 6, the up-and-down tongues 14 and 14 therefore, by carrying out rotation operation individually connection -- the screw thread of members 10 and 10, if increase and decrease of the amount of bell and spigots of the screw-thread shafts 13 and 13 over holes 11 and 11 of regulation are carried out Since a base material 9 tilts, the standing-up angle changes and the degree of tilt angle to the vertical plane of press side 4a of the press die 4 changes in connection with it, it is possible to perform such regulation and to carry out change regulation of the degree of tilt angle of press side 4a.

[0023] On the other hand, the above-mentioned arm 7 which equipped the upper-limit section with the press die 5 of the other side is supported by the level pivot 15 of position fixation of the part near the bottom of the press die 5 at the rockable. moreover -- while the eccentric cam mechanism 8 has the rotating cam 18 which fixed to the axis of rotation 17 of a motor 16 -- this rotating cam 18 -- the soffit section of the above-mentioned arm 7 -- a possession **** long hole-like cam -- it has the composition which fitted into the hole 19 for this reason -- if a motor 16 is driven and a rotating cam 18 is rotated -- a rotating cam 18 -- a cam -- it slides with a hole 19, an arm 7 carries out both-way rocking around a pivot 15, and the press die 5 carries out approach estrangement movement to the press die 4 of one side through rocking of such an arm 7 In addition, the above-mentioned press dies 4 and 5 of a couple are projected on the bench 3 through the opening 21 of the shape of a slit established in the bench 3. Moreover, in drawing 1 , 20 shows the switch for controlling a motor 16 (drawing 2).

[0024] Explanatory drawing in which drawing 3 showed the physical relationship of the strip-like edge material 1 and press side 4a of the press die 4 of one side, drawing 4 (A), and (B) are explanatory drawings which expressed with the cross section the portion which meets the IV-IV line of drawing 3 . Like drawing 3 , the edge material 1 as a bending object is a strip-like, and has the edge of a blade 12 on the crosswise end edge. And two or more places which separated the interval of a longitudinal direction are equipped crosswise with the infeed 22 of the shape of a long slit, and the interval size H2 of the infeed edge 23 in those infeed formation parts and the crosswise end edge (edge of a blade 12) of the edge material 1 is shorter than the width-of-face size H1 in the part in which the infeed is not formed.

[0025] Moreover, as explanatorily shown in drawing 4 (A) and (B), each press side 4a and 5a has countered, and, as for the press dies 4 and 5 of a couple, the edge material 1 is arranged among them. Moreover, as 4a of the press die 4 of one side was explanatorily shown in drawing 3 , each press sides 4a and 5a have the long and slender configuration crosswise [of the edge material 1]. Any even if these press sides 4a and 5a are flat flat sides, they choose by the horizontal section configuration being the cylinder side out of which swelled circularly and it came should take into consideration the degree of hardness of the edge material 1 etc., and it should choose suitably.

[0026] Furthermore, each press sides 4a and 5a of the press dies 4 and 5 of a couple incline the edge material 1 arranged perpendicularly among them in the shape of an upper aperture to the perpendicular superficies 13 and 13 of the edge material 1 by ***** so that it may understand by drawing 4 (B). By the example of drawing, although the degree theta 1 of tilt angle of press side 4a of the press die 4 of the one side which receives the superficies 13 of the edge material 1, and the degree theta 2 of tilt angle of press side 5a of the press die 5 of the other side are set as the same angle, changing these degrees theta1 and theta2 of tilt angle is also considered.

[0027] Next, how to carry out bending of the edge material 1 using the above-mentioned edge material bending equipment is explained. After turning the edge material 1 among them, turning the edge of a blade 12 down and arranging perpendicularly in the state where the press die 5 of the other side was made to desert to

the press die 4 of one side by this method like drawing 2 or drawing 4 (A), the press die 4 of one side is made to carry out approach movement of the press die 5 of the other side in an operation of the eccentric cam mechanism 8 by starting the motor 16 explained by drawing 2. Since press side 5a of the press die 5 of the other side forces the edge material 1 on press side 4a of the press die 4 of one side like the arrow F of drawing 4 (B) by doing in this way, the edge material 1 is inserted by the press dies 4 and 5 of these couples, it is compressed in the thickness direction, the amount of compression at that time is balanced, and the edge material 1 extends to a longitudinal direction. It is a compression extension process. Sign d has shown the maximum amount of compression of the edge material 1 compressed by press of press side 4a of the press die 4 of one side, i.e., the thick maximum decrement of the edge material 1 produced by compression, (the maximum reduction width of face) to drawing 4 (B).

[0028] Here, since each press side 4a and 5a inclines in the upper aperture state to the superficies 13 and 13 of the edge material 1, at this compression extension process, the amount of compression increases gradually the part near the edge of a blade 12 in the compression part over the edge material 1. Therefore, a part with the extension length of the edge material 12 by compression near the edge of a blade balances the amount of compression, and becomes long, and the part more distant from the edge of a blade 12 balances the amount of compression, and becomes short. Moreover, the edge of a blade 12 extends only length face **** simultaneously same length, although the compression part near the edge of a blade 12 extends. Therefore, it deforms into the curve configuration out of which the edge of a blade 12 of the edge material 1 swelled and came in a compression part.

[0029] With this operation gestalt, since it has compressed by ****(ing) the edge material 1 in respect of [4a and 5a] long and slender press of the press dies 4 and 5, the press force by the long and slender press sides 4a and 5a concentrates on the compression part of edge material efficiently, and extension of the edge material 1 is performed efficiently.

[0030] In bending of the edge material 1, the work of bending the edge of a blade 12 in the range or overall-length portion as which the edge material 1 was determined is done. In this case, it is a means to, move to ** the edge material 1 placed on the bench 3 explained by drawing 1 or drawing 2 one by one on the other hand by the longitudinal direction, and it is desirable to locate the range or overall-length portion as which the edge material 1 was determined among the press dies 4 and 5 of a couple one after another, and to repeat the compression extension process by those press dies 4 and 5. For example, parts N1 and N2 which the edge material 1 compresses by moving the edge material 1 in the direction of arrow a as explanatorily shown in drawing 5 Nn is located among the press dies 4 and 5 of a couple one after another, and they are those parts N1 and N2.. A compression extension process is repeated to Nn. If it does in this way, the edge of a blade 12 will deform in the shape of a curve in the range or overall-length portion as which the edge material 1 was determined. In the edge material 1 shown in drawing 5, the compression extension process is carried out to the illustrated whole range. It may be possible for a crevice to be appointed between the parts to compress and for it to be made not to perform a compression extension process to the crevice portion depending on the case, although it is desirable to carry out with a means to define without a crevice the part which the edge material 1 compresses, and to carry out compression extension of those parts one after another as for a compression extension process as shown in drawing 5.

[0031] Drawing 9 has illustrated the plane view configuration of the edge material 1 of the shape of a strip with possible making the edge of a blade 12 deform with the application of the bending method and bending equipment which were explained with the above-mentioned operation gestalt. In the edge material of this drawing, it has the portion P1 which swelled and appeared in the interstitial segment of the longitudinal direction of the edge material 1 at one side, and has the portions P2 and P3 which swelled and appeared in the both sides at the side else. Such edge material 1 of a configuration can be manufactured using an automatic edge material bender. Moreover, drawing 11 - drawing 13 show the bending procedure for obtaining the edge material 1 attached in the rotary die 100 explained by drawing 14. Drawing 11 shows the edge material 1 by which bending was carried out to the plane view abbreviation rectangle using the automatic edge material bender, and it is possible to apply the bending method which starts this invention to this edge material 1. In the

edge material 1 before applying the bending method concerning this invention, the whole edge of a blade 12 is located on the virtual level surface so that it may understand by drawing 11 . Drawing 12 shows the state where bending of the one side of the rectangular edge material 1 was carried out in the way explained by drawing 5 from the edge to the middle part. As shown in this drawing, in this stage, it is changing to the curve configuration out of which the side view configuration of the edge of a blade 1 swelled and came in the portion into which bending was performed. The edge material 1 obtained by performing such bending to one side and its opposite side of the rectangular edge material 1 is shown in drawing 13 .

[0032] It is also possible to start from the interstitial segment of the range as which the compression extension process was determined at this point to the edge material 1 although the case where a compression extension process was performed sequentially from the edge was explained and it excelled with the operation gestalt explained above to the range or overall-length portion as which the edge material 1 was determined, or an overall-length portion. Drawing 8 shows the configuration of the press sides 4a and 5a in the case of performing a former means, and this configuration is the same as the configuration of the press sides 4a and 5a where it explained with the operation gestalt.

[0033] Moreover, it is also possible by devising a device to the configuration of the above-mentioned press dies 4 and 5 of a couple to carry out bending in the part which is curving in the thickness direction of the edge material 1, or to carry out bending in the part crooked right-angled in the thickness direction of the edge material 1. Drawing 6 shows the former example. The plane view configuration of the press dies 4 and 5 of a couple is made into point ***** , and the press sides 4a and 5a are made to provide at those noses of cam in this example. Since it is possible to arrange the press die 4 to the space even if the space by the side of the internal corner of the curve part of the edge material 1 is narrow if such press dies 4 and 5 are used, it is possible to carry out bending in the part which is curving in the thickness direction of the edge material 1. Moreover, drawing 7 shows the latter example. One [at least] side of the press dies 4 and 5 of a couple is made into the flat sides 4b and 5b, and flat side 4b of the press die 4 of one side is made to have met the superficies of the internal-corner part of the edge material 1 in this example. In this way, if it sets, it is possible to carry out bending of the edge material 1 crooked right-angled with the press dies 4 and 5 of a couple in the incurvation part. Proper use of such press dies 4 and 5 is attained by making the press dies 4 and 5 removable composition to the base material 6 and arm 7 which were explained by drawing 2 .

[0034] Drawing 10 shows the modification of the edge material 1 which is a bending object. The edge of a blade 12 is formed in the wave in this edge material 1. If bending of such edge material 1 is carried out, the edge material for rotary dies which can be used for forming a perforation in a work will be obtained.

[0035] In drawing 2 , although what carries out approach estrangement is explained to the press die 4 of one side and it excels in it when the press die 5 of the other side rocks a pivot 15 as a center, the press die 5 of the other side moves horizontally, and approach estrangement can be carried out at the press die 4 of one side.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the external view having shown the operation gestalt of the edge material bending equipment for rotary dies concerning this invention.

[Drawing 2] It is explanatory drawing having shown the internal structure of bending equipment etc.

[Drawing 3] It is explanatory drawing having shown the physical relationship of the edge material at the time of performing a compression extension process, and the press side of the press die of one side.

[Drawing 4] Explanatory drawing having shown the portion to which (A) meets the IV-IV break line of drawing 3 in the state where the press die of a couple has deserted, and (B) are explanatory drawings having shown the portion which meets the IV-IV break line of drawing 3 in the state where the press die of a couple is approaching.

[Drawing 5] It is explanatory drawing of a compression extension process.

[Drawing 6] It is explanatory drawing having shown the advantage by the configuration of a press die.

[Drawing 7] It is explanatory drawing having shown the advantage by other configurations of a press die.

[Drawing 8] It is configuration explanatory drawing of a press side.

[Drawing 9] It is explanatory drawing which illustrated the plane view configuration of the edge material by which bending was carried out in the thickness direction.

[Drawing 10] It is explanatory drawing of other edge material.

[Drawing 11] It is the external view of the edge material before bending.

[Drawing 12] It is the external view of the edge material in the middle of bending.

[Drawing 13] It is the external view of the edge material after bending.

[Drawing 14] It is explanatory drawing having shown the busy condition of a rotary die with the perspective diagram.

[Drawing 15] It is explanatory drawing having shown the busy condition of a rotary die with the side elevation.

[Drawing 16] It is explanatory drawing of strip-like edge material.

[Drawing 17] It is explanatory drawing of the conventional bending method.

[Drawing 18] It is explanatory drawing of roller geometry.

[Drawing 19] It is explanatory drawing of the edge material as a ready-made article by which bending was carried out.

[Description of Notations]

1 Edge Material

4 Five Press die

4a, 5a Press side

6 Tilting Mechanism

7 Arm

8 Eccentric Cam Mechanism

12 Edge of a Blade

15 Pivot

22 Infeed

H2 Interval size of the infeed edge in an infeed formation part, and the crosswise edge of edge material

H1 Width-of-face size in the part in which the infeed is not formed

[Translation done.]

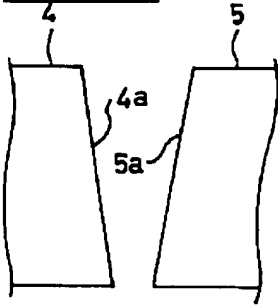
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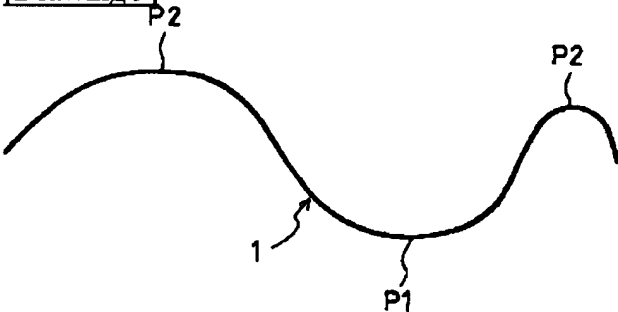
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DRAWINGS

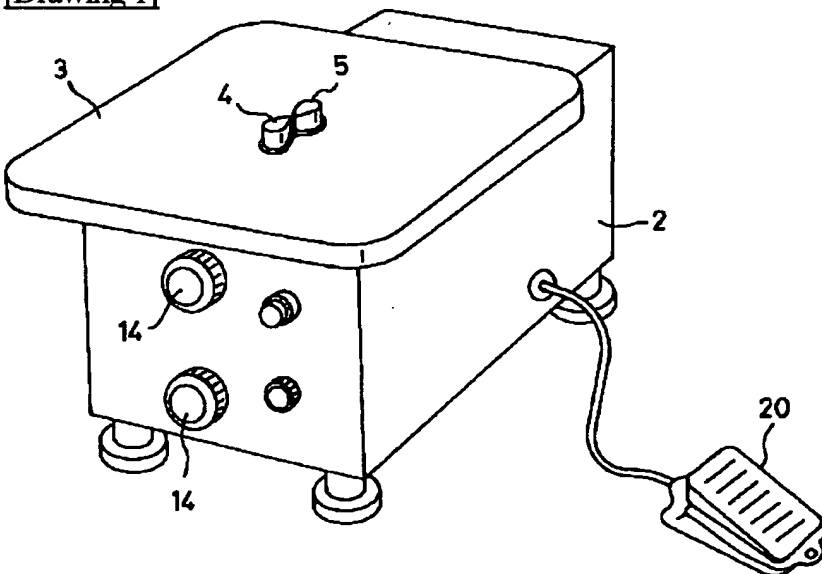
[Drawing 8]



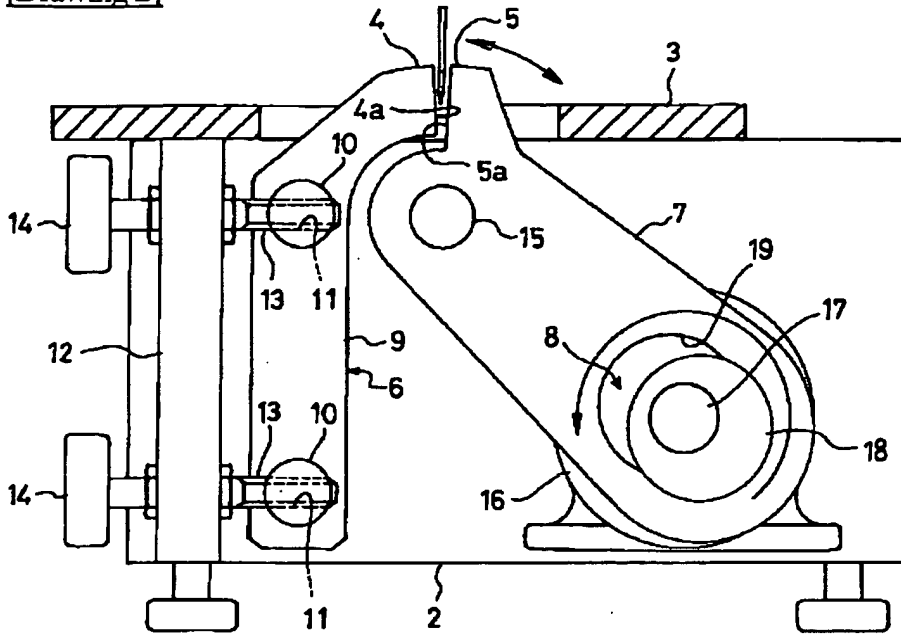
[Drawing 9]



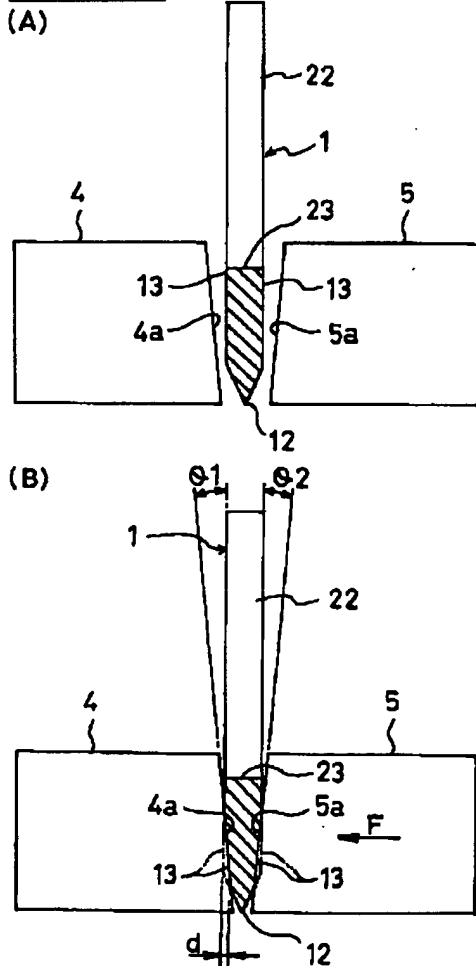
[Drawing 1]



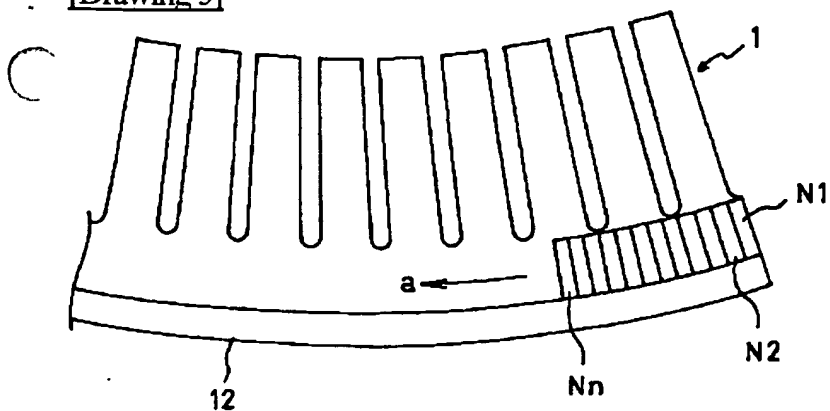
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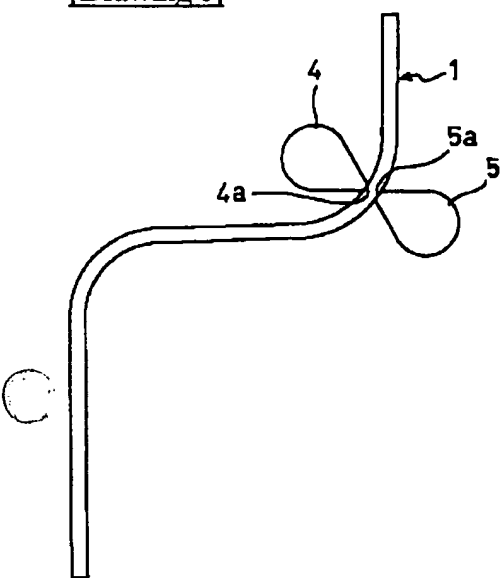
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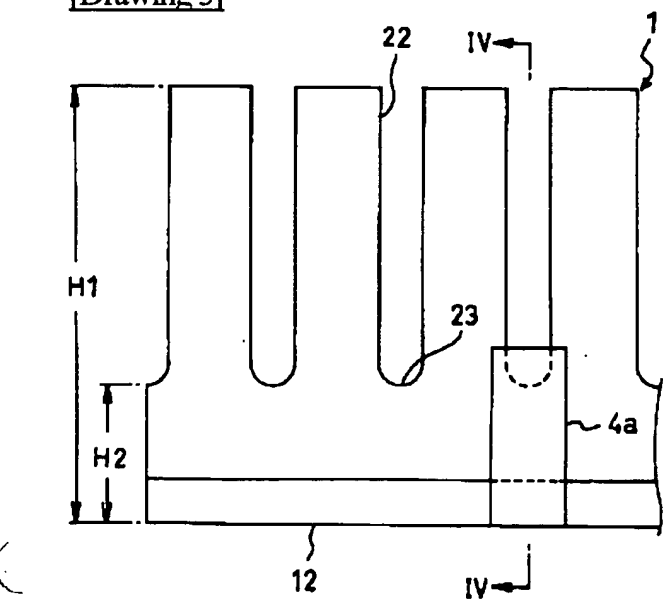
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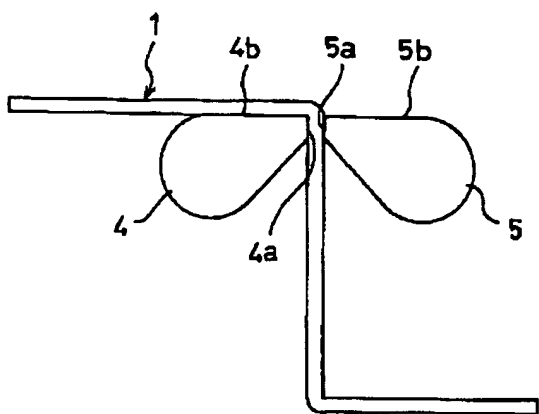
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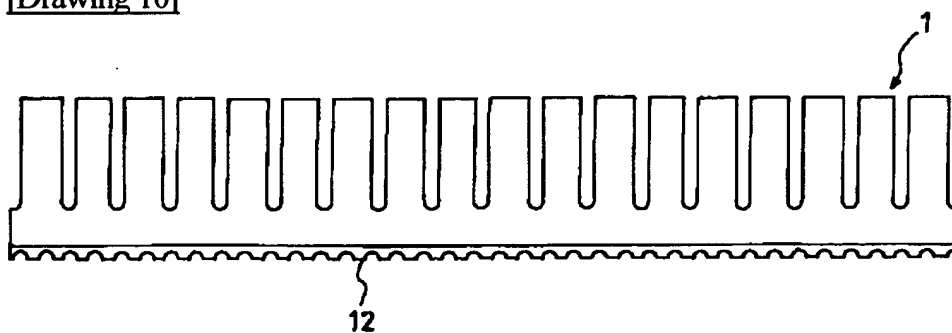
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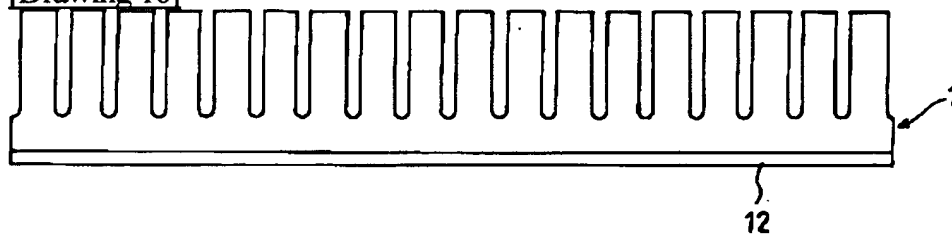
[Drawing 7]



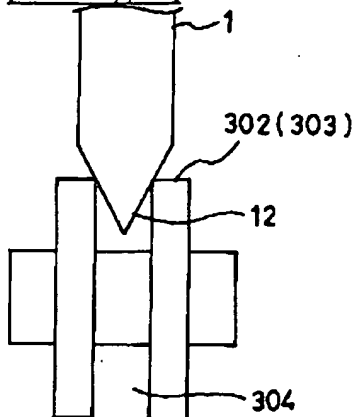
[Drawing 10]



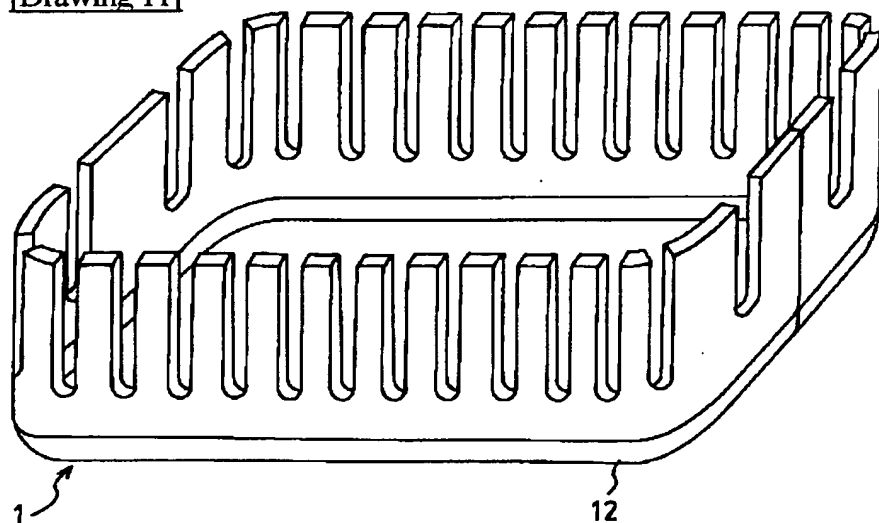
[Drawing 16]



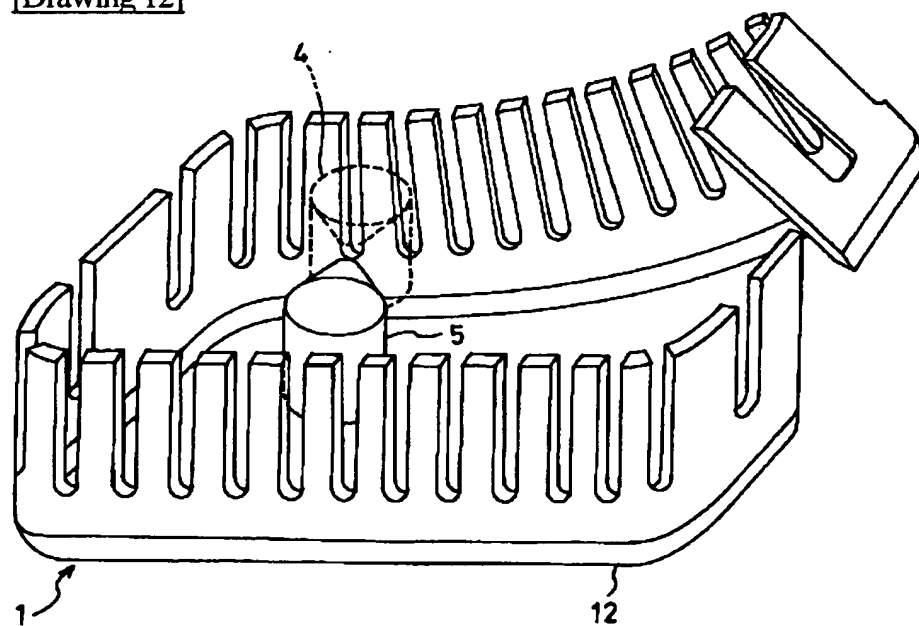
[Drawing 18]



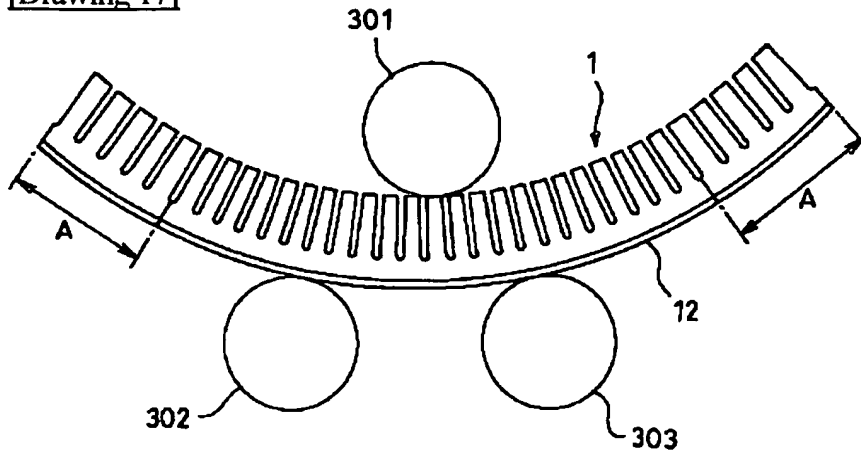
[Drawing 11]



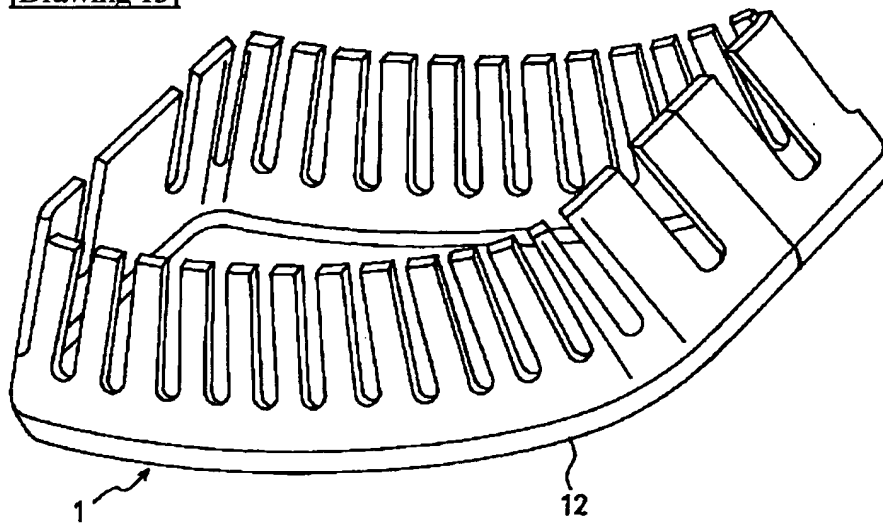
[Drawing 12]



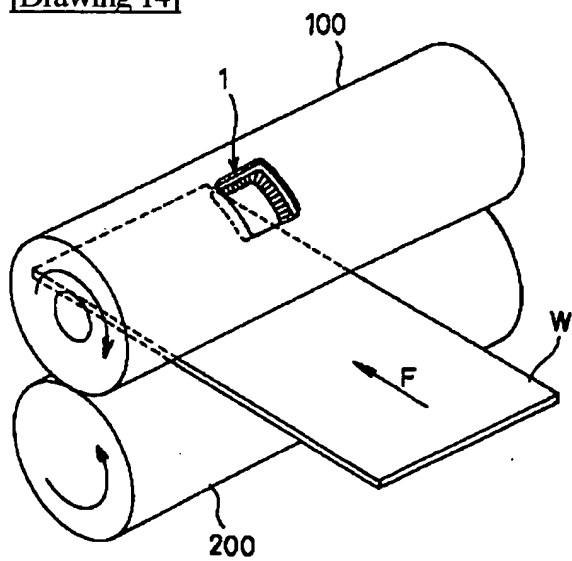
[Drawing 17]



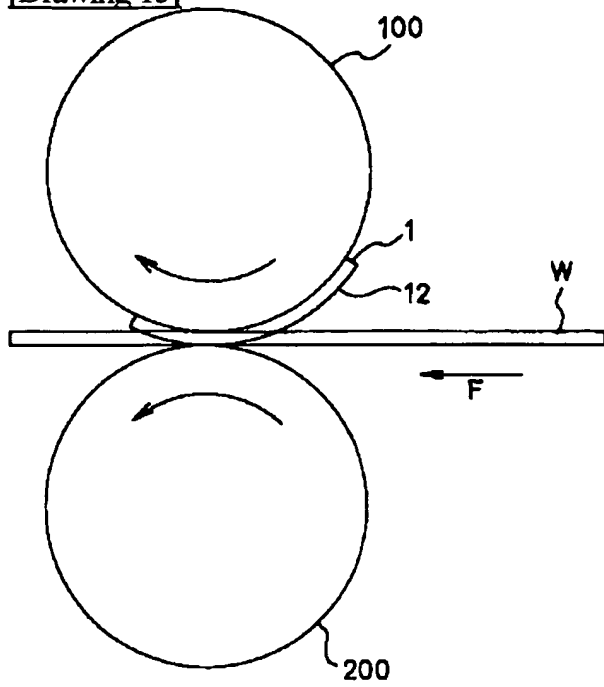
[Drawing 13]



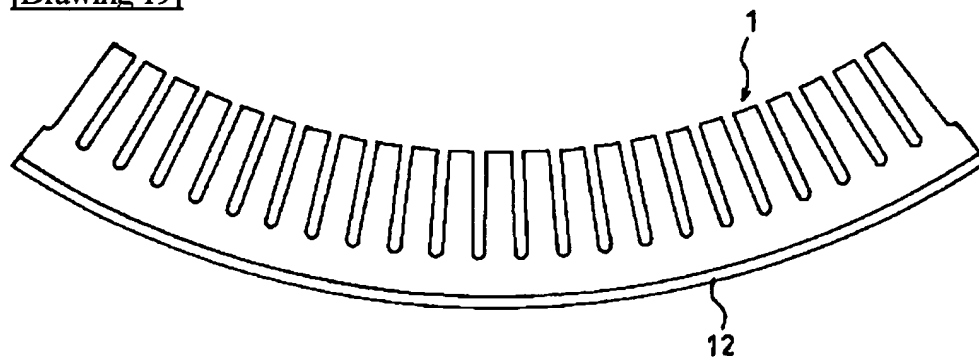
[Drawing 14]



[Drawing 15]



[Drawing 19]



[Translation done.]